A CONSIDERATION OF THE PARAPLEGIA OF POTT'S DISEASE WITH ESPECIAL REFERENCE TO THE RESULTS OBTAINED BY MECHANICAL TREATMENT.

An Analysis of Forty Cases Occurring in the Service of the New York Orthopædic Dispensary and Hospital.

By NEWTON M. SHAFFER, M.D.

When your President kindly invited me a few weeks ago to participate in the dicussion of the subject which brings us together to-night, and the part was assigned me of speaking upon the Results of Mechanical Treatment, I found, after making the effort, that the time was too short to make a comprehensive digest of a large number of cases. Dr. T. Halsted Meyers had, however, already made a brief and concise contribution to the subject,[1] in which he says regarding the 1,570 cases which he investigated that it was " A number far too large to tabulate." It seemed to me, under these circumstances, that a critical analysis of the available cases occurring in the practice of the New York Orthopædic Dispensary and Hospital and a somewhat rigid scrutiny of the results obtained, would be of service, and with this end in view, and with the kind and most persevering assistance of Dr. P. H. Fitzhugh, of the dispensary staff, I have been able to collect a sufficient number of cases to aid us, I think, in our deliberations.

In approaching the subject I instructed Dr. Fitzhugh:

1st. To report all the cases available occurring in the service of the institution which had been under its continuous care and which had afforded enough co-operation at home to make the treatment reasonably effective.

2d. All such cases, "good, bad or indifferent," were to be tabulated and reported in full.

---

[1] "The Prognosis of Pressure Paralysis." The Times and Register, Nov. 29, 1890.

3rd. Under no circumstances were the cases to be selected and none, however bad the result, were to be rejected.

The number of cases which we are able to report, in the limited time at our disposal and under these conditions, is forty. With a much longer time for preparation many other cases might be traced, a final examination made, and the result recorded. But it is fair to assume that the cases here reported represent the average results obtained by the methods pursued in the institution in its outdoor practice.

And it seems only right to say in connection with these cases that they all occurred among the poorer classes of the tenement house population; that all of them were treated at their homes under not very favorable conditions, and that they were visited at regular intervals by some member of the dispensary staff, the mother, or some more or less interested relative or friend caring for the patient between the professional visits. Under the conditions which exist in private practice the results obtained are doubtless much better.

All these patients were subjected, generally speaking, to the same treatment. That is, a Taylor spinal brace was applied, with or without the ball and socket chin piece attachment, and necessarily all were treated in the recumbent position—the patient lying on his back upon a tolerably firm mattres, without any pillow. The apparatus was adjusted to that position which would steady and support the entire spinal column without producing undue pressure at any point. After the final adjustment of the apparatus, which took perhaps several days, periodical visits were made, the pressure line of the support was inspected and the apparatus was modified if necessary. Iodide of potassium was not used and no special internal medication was employed—the main principle of treatment being to produce a practical immobilization of the spine—especially of the diseased region.

Several tables have been prepared showing the age, first symptoms, duration and kind of paralysis, location, abscess, results, etc., to which I beg to call your attention before making any extended comment on the lessons they convey.

Twelve tables in all are submitted, to which I beg to direct your attention.

TABLE No. I.

Age of Patients on admission to the Dispensary.

From two to three years	3 Cases
From three to four years	6 Cases
From four to five years	3 Cases
From five to six years	5 Cases
From six to seven years	4 Cases
From seven to eight years	5 Cases
From eight to nine years	5 Cases
From nine to ten years	1 Case
From twelve to thirteen years	1 Case
From thirteen to fourteen years	1 Case
From fifteen to sixteen years	1 Case
Seventeen years	1 Case
Eighteen years	1 Case
Twenty years	1 Case
Twenty-nine years	1 Case
Forty-three years	1 Case
Total	40

It will be seen that all ages are represented in this table, thirty-two being under ten years of age, three being above that age, the oldest being forty-three.

TABLE No. II.

Showing the Location of the Disease.

(With a single focus of disease.)

In the cervical vertebræ	2
In the cervico-dorsal vertebræ	3
Dorsal, upper vertebræ	11
Dorsal, middle vertebræ	14
Dorsal, lower vertebræ	4
Dorso-lumbar vertebræ	3
	37
(With double foci.)	
Upper dorsal and lumbar	1
Cervico-dorsal and dorso-lumbar	1
Upper dorsal and dorso-lumbar	1
Total	40

Of these forty cases thirty-three were affected in the middle dorsal, upper dorsal or cervical regions. Three had disease both in the dorsal and lumbar regions.

TABLE No. III.

Duration of disease before the symptoms of paralysis occurred.
The disease had existed

Under one year	in 8 Cases
Between one and two years	in 13 Cases
Between two and three years	in 4 Cases
Between three and four years	in 5 Cases
Between five and six years	in 3 Cases
Between six and seven years	in 1 Case
Between seven and eight years	in 2 Cases

Ten years	in 1 Case
Eleven years	in 1 Case
Twelve years	in 1 Case
Not stated	in 1 Case
Total	40

It will be noted in this table that the paralysis appeared in thirty cases after the disease had existed from a few months to five years. Thirteen occurred between one and two years, while one each occurred ten, eleven and twelve years after the disease was first discovered.

TABLE No. IV.

First Symptom of Paralysis.

More or less sudden loss of power	in 15 Cases
Gradually increasing weakness of lower extremities	in 13 Cases
Exaggerated patellar tendon reflex with ankle clonus	in 9 Cases
"Numbness"	in 1 Case
Not stated	in 2 Cases
Total	40

It is not always asy to determine, among the class decribed in this paper, just when the first symptom of paralysis occurred. A slight weakness or even an irregularity in gait is not always noticed unless it is preceded by some distinct traumatism. In one case occurring in private practice I am sure the disease (seventh cervical and first dorsal) had existed for at least two years without detection—a somewhat sudden attack of partial paralysis causing the attending physician to examine the spine. This is especially true of the seventh cervical and first dorsal, but much less so of the mid-dorsal and dorsal lumbar regions.

TABLE No. V.

Relation of Abscess to the Paraplegic Symptoms.

Cases with abscess	12
Cases without abscess	28
Total	40
Apparently benefitted by opening of abscess	4
Apparently not benefitted by opening of abscess	1
Apparently having no effect	7
Total	12

Of the seven reported as having no effect:

Disappeared spontaneously	4
Appeared before the paralysis	2
Appeared after the paralysis, was cured	1
Total	7

This table seems to need no special comment, except that the " twenty-eight cases without abscess " might better be written " twenty-eight cases without external evidence of abscess." No doubt in some of the twenty-eight cases a small abscess existed, which either became absorbed or encysted.

TABLE No. VI.

Amount of Deformity.

Slight	14
Marked	21
Great	5
Total	40

Dr. Myers calls attention to the fact " that the character of the kyphosis does not affect the paraplegia." The table would seem to indicate the same conclusion. The paralysis was no greater in the cases with " great " deformity than in the "slight " cases. It was sometimes quite the reverse.

TABLE No. VII.

Showing the Variety of Paralysis, with or without Bladder or Rectal Symptoms.

Simple motor paralysis	24
Motor and sensory paralysis	16
Total	40

It is unusual for a sensory paralysis to develop first. There is usually a slight motor invasion, followed in some cases by a sensory disturbance later. The primary invasion of sensory symptoms, especially if accompanied by much pain, always suggests malignant disease—a benign tumor, or some traumatic invasion of the spinal canal.

TABLE No. VIII.

Duration of Motor Paralysis after Treatment was begun. There were in all 24 cases of motor paralysis.

Of the CURED CASES the paralysis existed

Three months	in 1 Case
Six months	in 4 Cases
Eight months	in 4 Cases
Nine months	in 1 Case
Ten months	in 2 Cases
One year	in 2 Cases
Sixteen months	in 1 Case
Two years	in 4 Cases
Two years and two months	in 1 Case
Two years and three months	in 1 Case
Total	21

Of the Cases STILL UNDER OBSERVATION, the paralysis has been present,

Two years	in 1 Case
Six years	in 1 Case
Ten years	in 1 Case
Total	3
Total	24

This table, which shows the length of time the patients received tratment for the paralysis, is a very important one. It will be considered in the body of the paper.

TABLE No. IX.

Duration of Sensory Paralysis (after treatment was begun) either with or without Bladder and Rectal Symptoms.

In the cured cases the paralysis existed

Two months	in 1 Case
Three months	in 2 Cases
Five months	in 1 Case
Eight months	in 1 Case
Twelve[1] months	in 1 Case
Eighteen months	in 3 Cases
Two years	in 1 Case
Two[1] years and three months	in 1 Case
Total	11

STILL UNDER OBSERVATION.

One[2] and one-half years	in 1 Case
Three years	in 1 Case
Three[2] and one-half years	in 1 Case
Six years	in 1 Case
Died	1 Case
Total	5
Total	16

Like Table No. VIII., this will receive attention later in a discussion of the results of treatment.

---

[1] These two had sensory paralysis without bladder or rectal symptoms.

[2] These two have recovered from bladder and rectal symptoms, but have a remaining persistent motor paralysis.

TABLE No. X.

Giving the length of time in which Paralysis developed after Treatment of the Pott's Disease was commenced.

The paralysis occurred, after treatment was commenced, in

One month	in 1 Case
Two months	in 5 Cases
Four months	in 1 Case
Six months	in 3 Cases
Ten months	in 1 Case
One year	in 3 Cases
One year and six months	in 1 Case
Two years	in 2 Cases
Three years	in 1 Case
Three years and six months	in 3 Cases
Four years	in 2 Cases
Five years	in 1 Case
Ten years	in 1 Case
Not stated	in 2 Cases
Total	27
Paralyzed when admitted to Dispensary treatment	13
Total	40

One might infer, if mechanical treatment could cure paraplegia, that it might more easily prevent its occurrence. But this is not wholly true. In fourteen cases the patients had been under treatment one year or less when the paralysis ensued. But these patients lead a rough life—go to public school and play on the streets and are subjected to traumatism at almost every step. In one case, paraplegia developed ten years after treatment was commenced, though it must not be thought that *acitve* treatment and supervision was kept up all this time. Even in the best and most carefully treated cases, paraplegia may occur. Many factors bear upon this point—our uncertain knowledge of just what bony changes are going on, and whether there is a closely retained abscess near the canal, are among them.

TABLE No. XI.

DEATHS.

Of general tuberculosis (still paralyzed)	1
Of general tuberculosis (after complete recovery)	1
Of pneumonia (after complete recovery)	1
Total	3

Only one death occurred while the patient was still under treatment for the paraplegia. Both the others had recovered and had been free from paraplegia for some months.

TABLE No. XII.

RESULTS.

Cases treated of simple motor paralysis	24
Recovered	21
Still under observation	3
Total	24
Cases treated of sensory and motor paralysis	16
Recovered	11
Died or still under observation	5
Total	16
Total	40

SUMMARY.

Treated, 40; recovered, 32; under treatment, 8[8].

Several conclusions may be drawn from a study of these cases and their histories as shown in the tables.

First of all comes the fact, proven by these rsults, that Pott's paraplegia, while a condition which demands prolonged care and attention, can ordinarily be cured in a large percentage of cases by careful mechanical treatment. And this being admitted, the question as to the detail of the mechanical support is important.

Whatever the treatment may be, it is of the utmost importance that the spine should be thoroughly "splinted." Simple recumbancy with or without traction by weight and pulley from the head and feet, is not sufficient. One must bear in mind, especially in dorsal disease, that even respiration is a traumatism, and that any unnecessary movement is contra-indicated. The head traction is useless in my experience, except perhaps in high up cervical disease. The plaster-of-paris jacket, while affording some support, fails to make the uniform pressure along either side of the spine. As indicated on a previous page, the simple antero-posterior support, made of malleable steel, and which can be adjusted with absolute accuracy, forms the most rational method of protection. This can be so changed in its bearings and so modified as to its pressure that adequate support can be secured which is neither uncomfortable nor irksome. A water bed adds greatly to the efficiency of the treatment, but an ordinary mattress well supported by boards underneath is generally all that is needed.

---

[8] Of the 32 recoveries, 15 walk well with exaggerated patellar tendon reflexes, 5 walk well with normal knee jerk, and of the remaining 12 we have no record of the reflexes.

We come now to a general consideration of the facts brought out by the tables.

Of the forty reported cases thirty-two recovered, three died, one while still paralyzed and under treatment, and one after recovery, both from general tuberculosis. One died from pneumonia after a full recovery from the paraplegia.

Of those remaining under observation, several, perhaps one-half, have a reasonable hope of recovery.

I might say here that in all the cases reported only one had bed sores and none had cystitis. Indeed, in children no attempt was made at catheterization and no serious inconvenience resulted. Perhaps this is the reason why there was such a uniform exemption from cystitis.

And I might say further that I have purposely avoided referring to the questions raised by the existence or absence of anæsthesia, hyperæsthesia, etc., in these remarks. The histories were too indefinite in this respect—because in some cases only gross tests were made, in others none at all.

The question may be asked, What shall be done with the four patients still under observation, who have been paralyzed from six to ten years? Shall mechanical treatment be continued indefinitely, or are they proper subjects for laminectomy?

It seems to me that in most if not all these four cases, degeneration of the spinal cord has occurred, and that an operation would be useless. It will be noticed that the longest duration of the paralysis, where recovery took place, with both the motor and sensory cases, was two years and three months, and that in all the recoveries only six got well after one year of treatment. Throwing out of the question incidental matters, such as variation in the home care, the resistance some children inevitably make to restraint, etc., it would seem that after one year has elapsed the hances of reovery diminish under mechanical treatment.

And this raises the question as to whether we are able to make an exact diagnosis in the earlier stages of paraplegia? I think we can—that is, we can judge very accurately as to the condition of the cord and its membranes, but I think we are unable to make an equally certain diagnosis as to the seat and extent of the bone lesion, the existence or non-existence of matter under pressure. This is proven in a case which occurred in St. Luke's Hospital in 1876, under the care of Dr. Abbe. In this case an autopsy showed disease of the eighth dorsal vertebra, which had become necrotic, and a very sharp spicula of bone had been thrust forward into the canal, producing an almost complete section of the cord. Up to a certain point the man's symptoms had not been unfavorable, and the sudden onset of urgent symmptoms was unexplained until after his death.

Itseems to me that we are fully justified in saying that a case of simple motor paralysis should not be subjected to laminectomy. As long as the sensory tract is unaffected, surgical interference is uncalled for. And even if the sensory area is involved with vesical and rectal paralysis, the chances are very favorable for recovery without operation. If my tables are correct, the chances for recovery are at least 11 to 5 in the sensory cases, in dispensary practice, and the proportion of recoveries are much greater in private practice. In the motor paralysis the chances are 21 to 3, in dispensary practice, and th list of failures ought to be almost nil in private practice.

It is important to be able to recognize the approaching paralysis, and the condition of the reflexes is a valuable aid in this matter. Dr. T. Halsted Myers in his valuable paper[4] says: "The first indication of paraplegia is the exaggerated knee-jerk." In nine of the cases here reported the members of the staff recognized the approaching paralysis by the existence of an exaggerated knee jerk, associated with a slight ankle clonus. It is always a safe rule to at once place a patient with Pott's disease, with these symptoms, in bed with or without a suitable support. But a simple exaggerated knee jerk—or even quite a marked condition of this kind—does not necessarily indicate an approaching paraplegia. In chronic spondylitis of any of the vertebræ above the first lumbar, the pattellar reflex is often greatly exaggerated, and it may remain so almost indefinitely, with no subsequent symptoms elsewhere. But add to this even a slight clonus at the ankle and the case at once assumes a different aspect.

As a matter of illustration, I may mention the condition of a patient now under observation, a child of 5 years, with disease at the second dorsal. A month ago I noticed an exaggerated patellar reflex following a simple, but somewhat prolonged cough from bronchitis. The knee jerk, already slightly exaggerated, became much more so, and a slight ankle clonus appeared. The patient was placed in bed, and strict recumbency with sand bags at either side of the body, was maintained. For two weeks no improvement occurred. I then applied a light spinal brace without a chin piece, adjusting it carefully to the outline of the spine. In one week the clonus became modified and soon wholly disappeared. If this were an exceptional case, it might not be worth recording. But I have had the same experience on several other occasions, and I venture to record it as a not unimportant clinical fact.

---

[4] Op. cit.

The point I wish to emphasize is that the prodomata of the paraplegia of Pott's disease are generlly well marked, and ought to be easily recognized.

Another clinical fact might be recorded here: Whooping cough, especially if it occurs in connection with dorsal disease, is very apt to be followed by not only a rapidly increasing deformity, but it may also be followed by a persistent paraplegia. Any prolonged cough, persistent hiccough, or severe sneezing endangers the cord, especially in dorsal disease.

The relation of abscess to the paraplegic symptoms is very interesting. In a case early in my experience, involving the 7th to 10th dorsal, a somewhat sudden paraplegia was followed by the appearance of a large inter-costal abscess. Aspiration produced almost immediate relief, and a cure soon resulted. I have been interested in similar cases ever since, but the relation of abscess to the paraplegia is not a certain one. Table No. V. will illustrate this very clearly. Of the 40 cases, 12 had abscesses, and 28 had no external evidence of abscess. Four of the 12 were apparently benefitted by opening the abscess, and one was not benefitted; and in seven instances the abscess had no apparent effect on the paraplegic condition. In two cases the abscess appeared before the paraplegia, and in one case abscess appeared after recovery.

The location of the disease is very suggestive. Of the 40, 37 had a single focus of disease; 2 in the cervical region, 3 in the cervico-dorsal, 11 in the upper dorsal, 14 in the mid-dorsal, and three in the dorso-lumbar. Paralysis from the lumbar disease is very rare in my own experience. Dr. Myers[5] found 18 in 218 cases.

The remaining three had double foci of disease. One, upper dorsal and lumbar; one, cervico-dorsal and dorso-lumbar; and one, upper dorsal and dorso-lumbar. In each one of the three cases it is probable that the upper focus of disease produced the paralysis.

It would seem from Table No. III., that paraplegia may develop at any time in the history of the disease, and I have known patients who are supposed to be well to have paraplegia. In one of the cases reported upon to-night, paralysis occurred before any deformity existed. My table shows that it may occur as early as a few months after the disease has been recognized, or as late as 13 years after its first appearance. It is safe to say that no patient is free from paraplegia until the tubercular process has entirely stopped and the vertebræ are consolidated, though, of course, as the time passes, the danger of paralysis becomes less.

As regards the duration of the motor paralysis, under mechanical treatment, in those who recovered, it will be seen in Table No. VIII. that it existed in periods varying from 3 months to 2¼ years in 21 cases. The average duration of the simple motor paralysis was about 7 months.

The duration of the sensory paralysis, with bladder and rectal symptoms in 9 cases, varied from 2 months to 2 years. The average duration of the paralysis was 10 months.

In two cases, with sensory paralysis, without vesical or rectal symptoms, the duration of the paralysis was 19½ months.

Of those who still remain under observation—8 cases in all—two have recovered from severe and prolonged blatter and rectal symptoms, but have remaining a persistent motor paralysis.

Of these eight cases, four represent a series of cases to which full reference has been made, the question being: Are they fit subjects for laminectomy?

In closing my remarks, I would like an opportunity to record before the Society a fact which I think has not been referred to before.

Pott's disease, in the dorso-lumbar region, as well as in confirmed rotary lateral curvature in the same region, may seriously interfere with, or may wholly arrest, menstruation. I have the records of four cases which bear upon this point. The first one is a woman now about 48 years old. I first saw her over 20 years ago. Up to 20 years of age she had been apparently a healthy woman, menstruating regularly. At that age she developed Pott's disease involving the last three dorsal and the first and second lumbar vertebræ. The disease progressed rapidly, with the formation of an intra-pelvic abscess on the left side, which gave rise to no trouble and was gradually absorbed. At 25 she had ceased to menstruate, although she had maintained good general health through out the entire time, and was to all external appearances a well-developed woman. She has not menstruated since.

---

[5] Op. cit.

The second case, a woman of 25, when I saw her first about 15 years ago, had Pott's disease involving the 9th and 10th dorsal and the first lumbar vertebræ. The disease developed before adolescence. She never menstruated, although the mammary development was not below the average, and she looked like a well-developed and well-nourished woman.

The third case, involving the 12th dorsal and the 1st and 2d lumbar vertebræ, aged 35, in all external respects a fully developed woman, menstruated at intervals and very irregularly for a few years (the disease developed at 15), and after 25 or thereabouts, she menstruated only once in two or three years. And this week I examined a woman aged 43, with very marked rotary lateral curvature in the dorso-lumbar region, the curvature having existed since childhood, who has menstruated only 6 or 7 times in her whole life. In other respects, and aside from her deformity, she has been a healthy, active woman.

In several other cases I have found the menstrual function extremely irregular in women who have had Pott's disease in the dorso-lumbar region early in life.

I have never found a similar condition in Pott's disease above the 10th dorsal, though I have carefully questioned many patients whom I have examined.

These facts I have publicly mentioned on several occasions; before the Orthopædic Section of the N. Y. Academy of Medicine over five years ago, and in my lectures at the N. Y. Orthopædic Dispensary and Hospital during the past twelve years. I deem them worthy of a more permanent record and take pleasure in bringing them to your notice.